DATA PROCESSING DIGEST

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General Information

THE TOTAL SYSTEMS CONCEPT AND HOW TO ORGANIZE FOR IT

James M. Ewell, Proctor & Gamble Co.
COMPUTERS AND AUTOMATION, September 1961; pages 9-13

"Total systems" has a number of meanings. For example, at Bell Helicopter it means "a single system that cuts across existing department boundaries, bringing all major operating systems into one functional organization." At Shell Oil Company, it is "a completely integrated management information system that will encompass point of sale...at the plant level through final financial consolidation of figures by Shell's data processing center in New York." In Western Union's system, sales managers, controllers, treasurers, purchasing agents, production planning managers and quality control managers will be taken out of their separate departments and merged as a team "working together, analyzing the company's productive efforts, the effect on inventory, the company's sales efforts, and the associated effect on inventory and capital investment."

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At P & G, the "total system is the entire Proctor & Gamble business" involving the parent company and its subsidiaries all over the world. However, since the "total system" would also have to encompass the services and customers with whom the company must deal, the system is too vast to operate unless broken down into major systems and subsystems. The company "did a great deal of studying to determine which overall areas would prove to be the most rewarding and then determined which sybsystems in these areas would prove to be the basic building blocks upon which the entire system might be constructed." The company has evolved a three-phase approach:

1. Unbiased Study. The staff conducted "a completely unbiased objective analysis of the basic business requirements completely uncluttered by tradition" and with top level management backing.

2. Installation. The thoughts of operating people were incorporated into the broad outline developed during the initial study. Representatives from the affected operating departments were made members of the installation team.

3. Operation. The system, test run and debugged, became part of regular operations. The installation team disbanded and the operating people returned to their normal duties. The staff project leader gradually backed off as the line departments learned to live with the new system. However, there is a continuing responsibility by the staff for program maintenance and adaptation of specific programs to any changes in hardware, techniques or business needs.

The data processing responsibility joined with a number of staff operations which cut directly across all operating divisional lines. The data processing organization reports to an officer who has over-all corporate responsibility in certain staff areas. Eventually the company expects to have regional data centers linked with each other and with the corporate data center by wire. Some functions may be easily handled by small computers in the departments themselves, rather than by the central processor. Examples are engineering and research problems, and advertising promotions, such as the processing of coupons. In these situations, the data processing staff organization may act in an advisory capacity.

PROGRAMMED LEARNING AND THE USE OF TEACHING MACHINES— A REVOLUTION IN INDUSTRIAL TRAINING

Robert L. Chapman, Ramo Wooldridge, Canoga Park, California
COMPUTERS AND AUTOMATION, October 1961; pages 21-24

Programed learning is a way of presenting information to a person and developing his understanding step by step. He proceeds at his own pace, and by the nature of the program, must understand each point before going on to the next. Programed learning can be helpful right now to do more effective training; it has great market potential for serious competitors; and it promises drastic improvements in education.

A teaching machine can be used in programed learning to present the material, one item at a time, and providing a way for the student to indicate his answer. The machine can give the program wide latitude in choosing ways of presenting information and of being responsive to the student's needs. Programed learning involves the student actively, whereas previous instructional methods have been largely passive.

Linear vs branching techniques

Two opposing schools of thought in programed learning are the linear method (small steps which a student must learn one-at-a-time before progressing to the next step) and the branching method (where the student is switched back to remedial work if he does not understand the material at hand). Almost all tests of programed learning show that it produces results on the better side of those obtained by the standard lecture method. Some important side benefits are the clarification of training objectives and of instructional content. Also, because the student's answers are recorded, the effectiveness of the program can be evaluated.

Many of the programs are prepared by teams rather than individuals: an editor, a subject matter expert, and a person who has had experience trying to teach the material. As improvements are made in the technique and the machines, the cost will drop greatly. Even now, the method is competitive with current methods.

AUTOMATION ARRANGEMENTS BY COMMUNITY POOLING

Van Vechten Shaffer, Guaranty Bank & Trust Co., Cedar Rapids, Iowa
UNITED STATES INVESTOR, October 2, 1961; pages 27-30, 90

Automatic check handling is a top management problem, whatever the size of the bank, and unfortunately, few banks, except the very large ones, have the technical experience needed. Joint ventures may be an answer, but it will cost from $300 to $500 thousand, and the problems are multiplied by the number of banks in the venture. Where there is no direct competition involved, a correspondent or neighboring bank may be approached on a joint venture. Even where there is competition involved, safeguards can be set up. Unless 20 to 30 thousand accounts and a volume of 40 to 50 thousand items per day are involved, electronics is probably too expensive for the present. At the least, bankers should join into informal groups to study the joint venture problem. And primary to the effort is a uniform numbering system. Presently, NABAC has come up with one which will answer most banks' problems.

COOPERATIVE BANK AUTOMATION

John J. Feldman, The Howard Savings Institution, Newark, New Jersey
AUDITGRAM, October 1961; pages 12-18

Small banks must join together in an effort to share the costs of electronic data processing. This can result in data processing centers which may take any of six different forms: 1) the service bureau owned and operated by the equipment manufacturer; 2) space and equipment provided by the manufacturer with banks purchasing time and providing their own personnel for operation; 3) the cooperative, with joint ownership and operation by a group of banks; 4) the sharing of time on a large bank's data processing system; 5) a separate corporation formed by a group of banks to provide their data processing services; 6) equipment acquisition and operation by an existing bankers' organization.

The banks should cooperate in a four-point plan: 1) feasibility study, 2) system selection, 3) installation planning (including selection and preparation of the site, and selection and training of the programing and operating staff), and 4) vigilance over retaining qualified personnel, system maintenance, and program

maintenance. The banks should select a research group from their own organizations, and when the system is ready, a single group of technically oriented men should be provided to operate the cooperative installation.

Arguments are heard against cooperative ventures. These include: vital loss of security; necessity for standardizing operations. Both of these arguments have been refuted in practice. For example, The Howard Savings Institution, The Union Dime Savings Bank, and The Society for Savings, all in different states, found that their operating requirements were 95% compatible. It is suggested that banks organize on a regional or county basis, and select a team of qualified men to perform the necessary research now.

GOOD PRINTING—UNGLAMOROUS BUT VITAL PART OF ELECTRONIC BOOKKEEPING

D. W. Burns, First National Bank of Arizona, Phoenix, Arizona
JOURNAL OF MACHINE ACCOUNTING, October 1961; pages 39, 41

Good printing is the one overriding requirement for MICR. This bank has been encoding its own checks on an A.B. Dick automated offset machine with a second unit to be added. About two million checks are printed each month in the bank, and an equal number by outside printing firms. At first the bank ran extensive quality control tests by running samples of every check order through the computer's sorter-reader. However, they found this was not necessary, and now test only every tenth run, using a Hewlett Packard signal-strength tester and a Nikon 50-power microscope. A pre-printed offset master containing the transit and routing information is used. The typist adds the name and address of the customer and the account number in the E-13B characters. The bank has found it advisable to allow the checks to dry overnight before cutting and binding.

AUTOMATION ANSWERS

AUDITGRAM, October 1961; page 34

Banks, businesses, and check printers are being warned not to eliminate the fractional form of the routing symbol-transit number in the upper right-hand corner of checks when they encode this information in magnetic ink at the bottom of checks. This number must be retained to facilitate sorting and routing of checks and other cash items by all banks. This is what banks can do to prevent this omission from becoming a problem:

1. Banks printing their own checks should make sure their routing symbol-transit number is in both places on their checks.

2. Banks dealing with printers of bank checks, either directly or through their customers, should check to see that this requirement is clearly stated in the printing specifications and is met by the printers.

3. Banks noticing checks without the fractional routing symbol-transit number may wish to contact the drawee bank and call its attention to the omission.

RESPONSIBILITY FOR MICR SIGNAL LEVEL STANDARD BEING ASSUMED BY THE NABAC RESEARCH INSTITUTE

AUDITGRAM, October 1961; page 24

The NABAC Research Institute has assumed responsibility for maintaining the signal level standard of Magnetic Ink Character Recognition documents, which has been maintained by the G.E. Phoenix plant since the American Bankers Association adopted the MICR program. NABAC will provide standard test documents to banks, bank equipment manufacturers, and imprinters of MICR documents for a charge covering only basic costs.

AUTOMATIC DATA PROCESSING OF FEDERAL TAX RETURNS

Mortimer M. Caplin, Internal Revenue Service
THE PRACTICAL LAWYER, October 1961; pages 43-48

Automatic Data Processing is the only way the Internal Revenue Service can handle the demands being placed on it by an ever-increasing workload. Since 1930 there has been an increase in tax returns of more than 1000 percent. And this figure does not take into account the increased complexity of revenue laws and tax administration operations. ADP in the Internal Revenue Service will do the following:

Provide a systematic check on failure of individuals and business entities to file returns.

Verify the mathematical accuracy of returns filed and compute tax or refunds due.

Determine, prior to refund, whether a taxpayer is indebted for delinquent taxes for a prior year, or for a different tax -- or whether he has already claimed and received a tax refund for the same period.

Provide a consolidated tax account for each taxpayer that will reflect his current tax status at any given point of time.

Match data reported on information documents with corresponding data reported on taxpayer returns.

Classify returns for audit purposes.

As a by-product, information will be compiled for management reports and statistics of income.

Computers will monitor tax returns

The system will have three principal features: a master file of taxpayers, the taxpayer account numbering system, and centralized processing. The National Computer Center at Martinsburg, W. Va. will have a master file of business taxpayers and individual taxpayers. Each taxpayer's account number will contain codes indicating the classes of tax for which he is liable, and current status of his account. The code will also be used for addressing communications to him. Most account numbers will be based on Social Security numbers. Those not having such numbers will be given account numbers. The numbers now used by the Internal Revenue service to identify employers will be used as business identification numbers.

District Offices will continue to receive the returns. These will then be sent to one of nine Regional Service Centers where they will be edited, transcribed to punch cards, verified, and converted to magnetic tape. The tapes will then be sent to the National Computer Center to be processed against the master file. Updated magnetic tapes will be returned to the Regional Service Centers where they will be used to print bills, notices, inquiries, audit lists, and many other documents. At present the Atlanta Region is serving as the pilot project for the plan. One fly in the ointment might be the habit of many businesses of relying on profit and loss statements and other schedules attached to the 1120 forms, instead of entering the information on the form itself. It will be absolutely necessary to fill in the forms completely so that the keypunching operation can be carried out without extensive pre-editing. Lawyers are alerted to warn their clients of this problem.

INTELLIGENT SYSTEMS—FOR PROBLEMS THAT DEFY PROGRAMMING

AUTOMATIC DATA PROCESSING, September 1961; pages 23, 24

The solution of problems which are ill-structured is the next challenge in the use of computers. It is possible to program a computer program which would instruct the computer to search for the optimum method of solution, but this is inefficient, and research for better methods is proceeding. Prof. Minsky of M.I.T. defines five capabilities an intelligent system should have: coordinated search, pattern recognition, learning, planning, and induction. The intelligent system will probably be one or a combination of these two types:

1. A computer program with "heuristic" or self-learning characteristics which can be used on a general purpose, large scale computer.

2. Special purpose systems which incorporate self-organizing capabilities.

Some research projects which are now underway include: Language Theory and Symbolic Language, Neural Net Analysis, Psychological Perception, Recognition, Language Translation, and Problem Solving. It appears that the program itself will not be sufficient, but that the computer will have to be reorganized and improvements made in its capabilities in order to include the heuristic characteristics.

PERT—PRO AND CON ABOUT THIS TECHNIQUE

DATA PROCESSING (U.S.), October 1961; pages 40-44

Great things ahead for PERT?

"PERT...may be a crude but effective forerunner to a series of very sophisticated business computer applications... It is a technique or scheme, most applicable to control of research and development projects, which can be expressed mathematically and, therefore, programmed for computer processing of schedule data....The PERT method uses probability theory and linear programming to analyze and correlate a multitude of tasks which are parts of complex projects." However, "PERT is a simple technique, consisting of the following elements: 1) Project analysis and charting, 2) time estimates, 3) computation and report writing, 4) review, control and updating. Basic to the PERT method is an exhaustive and detailed analysis of what tasks are required to accomplish a project."

Equally important is the quality of time estimates assigned each activity, expressed in weeks. "The most likely time represents the judgment of the person best qualified to estimate the probable time required under reasonable conditions. The optimistic time is that required if everything goes perfectly; the pessimistic estimate assumes everything goes wrong that can. The chances that the activity could take more time than the pessimistic estimate, or less time than the optimistic, should be 100 to one."

PERT reports are used to assist management in planning and controlling one-time and first-time projects by pointing up probable future trouble areas and showing where resources may be available to help ease the load in critical tasks of a complex project.

Although similar, PERT and Critical Path Method have major differences. "PERT is designed for research and development type projects, where resources are held constant and time becomes the variant. CPM, useful as a production scheduling tool, is characterized by the fact that time is constant...and resources are varied in order to meet the schedule."

There are some problems involved with PERT: 1) The crude mathematics on which PERT is based leaves some question about its reliability. 2) The logic requires a rather large program and ample memory provisions on a computer. If not enough memory is available, a PERT problem must be run in sections, increasing the computer time. 3) There is some suspicion that PERT has created a group of experts which makes the process susceptible to becoming a vogue.

COTTAGE COMPUTING

Charles W. Adams, Adams Associates, Bedford, Mass.
DATAMATION, October 1961; page 53

"Cottage computing" is descriptive of a kind of computing reminiscent of the 17th century textile workers who worked in their own homes. In cottage computing, the scientist, engineer, or manager has access to a high-speed computer through some sort of simple but versatile console located in or near his own office and constantly at his disposal. Through it, he and the computer are in close communication. Although the user receives the impression of being in full command, the computer retains control of the entire operation, performing the work requested by the users on a schedule adjusted from moment to moment in accordance with the demands of the users.

This kind of computing will make digital computers increasingly useful in fields of endeavor where imagination and judgment play a leading role. New input-output schemes will be required to permit man and machine to communicate effectively, and elaborate information-retrieval, time-sharing and other special techniques can also be developed. This type of computing may put an end to the open-shop -- closed-shop controversy.

RANDOM ACCESS VS SERIAL ACCESS

AUTOMATIC DATA PROCESSING, October 1961; pages 20-24, 56, 57

Representatives of four computer manufacturers give their view of the advantages and disadvantages of random access and serial access memories. Those arguing for random access are Jack Crownshaw of NCR and James Martin of IBM. For serial access are Frank Land of Leo Computers and Geoffrey Ziman of Ampex. Here are the pros and cons:

CRAM is an example of RAM

The NCR Cram is used as an example of a random access system. The user is concerned with three questions: 1) Does the use of a random access memory show down the processing in cases where it is more logical to provide input data in sequential order? 2) Can it provide the same total filing capacity as magnetic tape at a comparable cost? 3) What additional advantages has it over magnetic tape? The RAM advocate believes that on sequential or random processing a properly designed random access system is "invariably faster than magnetic tape in Britain." Also, in the Cram one small store can contain a number of different but related records, while in conventional memory, the records for different types of records are kept on separate tape files. Cram also eliminates the limited storage of former RAM systems through its use of easily loaded cartridges. It is also believed that the "father and son" technique in magnetic tapes is unnecessary, therefore eliminated by use of the RAM systems. In addition, RAM systems provide greater programing flexibility.

Five ways in which random access systems have made installations more economical are listed:

1. Cost of the machine itself may be less than magnetic tape file equipment.

2. A random access machine may be faster.

3. All types of inquiries can be handled without delay.

4. There may be a savings in staff, particularly in tape handlers.

5. It may make it possible to tackle much more complex data-processing jobs.

Finally, it is suggested that it is "insufficient to consider random-access by itself for any application....both must be considered, and frequently the best solution is to have both types of units on the same machine. Only detailed timing and costing of the various approaches will answer this."

All systems use both methods

On the serial processing side, it is suggested first that every data processing system has some components of each type, and that "in most cases the advantages and disadvantages of the two systems must be balanced against their costs." Some of the advantages of serial storage are these: The computer can scan each entry in a file to draw attention to those which require management action; although data may arrive in random order, the output is nearly always required to be in batches in a particular order; more economical use of memory space may be made in the tape system where information block sizes may vary without the need to allow for insertion of records as in the random access system. Also the serial system is flexible as to changes of requirements or volume. Programs used frequently may be held in

the rapid access store, with less frequently used routines in "back store." Time sharing may be used to deal with inquiries, and it has been found that the ability of a computer to monitor records continuously has reduced the need for frequent interrogations. It is felt, also, that the "father and son" technique is vitally important in reprocessing information that has been carried out erroneously. A strong case is made for serial access for input and output data storage because of low cost and operational flexibility. However, for storage of computer programs, random access does provide more rapid access. "To date, however, economic factors have tended to favor serial access memories where large amounts of data are to be stored. Serial access gives certain advantages in flexibility in spite of the necessary sorting operations. Also control functions can more readily be organized from a serial access memory."

Programing

PROGRAMMING COMPUTERS FOR BUSINESS APPLICATIONS

Ned Chapin, Stanford Research Institute
Published by McGraw-Hill Book Co., 1961. $7.50

A practical introduction to programing, using real computers and real programing languages is the valuable contribution this book makes to the EDP field. The subject is presented simply and clearly, and with a minimum of the historical and background material so many authors seem to think necessary.

This book assumes the reader has both some native intelligence, and some knowledge of the electronic computer. The hardware aspects of computers are almost ignored, except in their relation to the programer. One might say the author has gone about teaching programing the way one would teach an adult to drive a car. Parts to be used and handled are identified, but no attempt at a short course in electronics is needed or made. The opening chapter describes the job of the programer and shows the reader how the programer fits into the computer installation. Chapter three is concerned with the preparation for programing, beginning with flow diagrams, and describing automatic coding.

Programing problems increase in detail work

Beginning with chapter four, examples of programing problems are given, beginning with the more powerful programing languages (COBOL, etc.) and progressing to more and more detailed programing and coding problems, using a variety of actual computers. The twelve examples cover a wide selection of programing problems; for example, programing for accuracy, translation programing, programing to save storage, subroutines and library programs. The appendix has repertoires for eight different automatic programing languages, from SOAP to COBOL. A glossary and a limited list of references are also included.

AN INTRODUCTION TO ELECTRONIC DATA PROCESSING FOR BUSINESS

Leonard W. Hein, Los Angeles State College
Published by D. Van Nostrand Co., Inc. 1961. $7.50

This is a beginning text for college students on the concept of computers and their use in business applications. The subject is treated in somewhat of a survey manner, with the idea in mind that the student will pursue some phase of the vast subject in more depth at a later date. Judged from this standpoint, the book does its job well. It begins by surveying the material to be covered and giving the reasons for the introduction of computers into the business world. The basic concepts of the electronic computer are covered in chapter two, followed in chapter three by a description of a hypothetical medium size computer which is used thereafter in the programing discussions.

The bulk of the book is devoted to the way information is gotten into, out of, and around inside the computing system. Little attention is paid to business systems themselves, or in the ways computers are used to facilitate data processing. Presumably this subject is taken care of in other courses. Advanced programing concepts are limited to interpretive routines, translators, and generators. The appendix summarizes the operating codes for the model computer used in the text.

Systems Design

CODING BUSINESS DATA

Gibbs Myers, Kearfott Div., General Precision, Inc.
DATA PROCESSING (U.S.), October 1961; pages 23-25

Along with the total systems concept, businesses must consider the total coding concept. "A failure to recognize the need for modern, efficient codes to replace awkward, outworn methods can result in excessive processing costs which may seriously impair the advantages of an electronic computer program." An adequate code must be able to denote "a number of related, significant factors that will together or separately, at various points of the processing, be required to segregate, classify or summarize the data to produce the desired results." The length of the code should be great enough to allow for group classification and expansion, but not too long to handle in terms of time and memory. Letters may be used, although they slow down manual sorting, and require double processing in machine sorting. However, single or double letters used as prefixes or suffixes to a numeric code, can generally be handled efficiently and usually have high mnemonic qualities.

Good codes usually have most of the following qualities: comprehensiveness, conciseness, durability, flexibility, facility, precision, compatibility, consistency. The relative importance of these qualities depends on the case at hand. Five basic codes are defined: sequence code, running from one up; block code, where a group of like items is assigned a sequence of numbers; decimal code, used in libraries and having the capacity for infinite subdivision and expansion within a small area; mnemonic code, which aids the memory; and the group classification code which provides for major and minor classifications of the items coded by using digital significance. This latter type of code is so popular it is often used in situations where a shorter block or sequence code would be adequate.

Codes must usually be made more comprehensive for use in integrated data processing systems, although in some cases, the basic structure can be retained. If this is not possible, the entire structure must be studied and redesigned, and the cost of this must be weighed against the additional coding which would have to be superimposed on the old code along with its effect on the efficiency of the data processing system.

TABSOL—THE LANGUAGE OF DECISION MAKING

T. F. Kavanagh, General Electric Co., New York, N.Y.
COMPUTERS AND AUTOMATION, September 1961; pages 15-22

"...Lack of efficient methods for thinking through and recording the logic of complex information systems has been a major obstacle to the effective use of computers in manufacturing businesses. To fill this need, the General Electric Company developed TABSOL." ((See: DPD, February 1961, page 1; "TABSOL -- A Fundamental Concept for Systems Oriented Languages.")

The important contributions made by computers in specific business applications such as order processing, inventory control, and payroll, developed confidence in computer performance and encouraged systems engineers to continue in applications research. Managers, too, saw that computers offered an approach to improved productivity, lower costs, and sharply reduced cycle times. "Operating a business requires an enormous amount of decision making....Once it is established that these operating decisions are rational, it should follow that they can be structured in a consistent, logical framework."

General Electric's Integrated Systems Project developed a technique called Decision Structure Tables which provide a standard method for describing complex, multi-variable, multi-

result decision systems. The article describes the system through the use of an illustrated example, and an explanation of the logic involved.

Management Sciences

WHAT MANAGEMENT GAMES DO BEST

William R. Dill, Carnegie Institute of Technology
BUSINESS HORIZONS, Fall, 1961; pages 55-64

In using a management game to train, be sure of these factors:

1. The game should fit the men who will play it -- complex enough to be interesting, but not too difficult to take time to learn.

2. The game should be easy to administer with the facilities at hand.

3. The lessons the game teaches should be fairly obvious and pertinent to the rest of the program.

4. The players should "respect" the game.

Games to train managers

A game designed to give experience in management will develop:

1. The ability to recognize new situations for what they are.

2. The ability to set goals and use them to distinguish important from trivial information, and to plan and control the execution of the job and the activities of others.

3. A willingness to define the information needed and go looking for it.

4. An understanding of the relationships among specialized activities within a firm.

5. A willingness to assume effective responsibility.

6. An ability to assess and classify experience, to delegate work, or pass it along to a successor in ways that will keep the organization headed toward its goals.

These call for a complex game which gives the players a great deal of information about their environment; requires evaluating, interpreting and regrouping this information; and requires decisions at several levels, from long-range policy and investment decisions to those about specific problems within production, marketing, and finance departments. This kind of game would test a team's ability to manage a going concern and to adapt to change.

Let the players make non-computerized decisions

The information should not provide all the information in the form of a direct accounting statement from a computer. More of it should be on an optional basis, but at a price. Moreover, the players need not always know exactly what information is available. The game should provide not only for making decisions but also for determining which decisions need to be made and for developing and implementing rules to simplify decision-making. The environment of the "world" in which the game is played should be complex so that results will not depend inordinately on one or two kinds of decisions that the team may make. On the other hand, it should not be so complex that it cannot be analyzed and does not respond to action. This could be damaging to team motivation. The environment should also put a premium on action that is well planned and intelligently coordinated over a period of time. Such an environment almost has to be simulated by a computer, but this still would provide only part of the environment. There has not been enough attention to the live interactions that managers have with other persons even within the playing teams. Players should be forced to develop their own courses of action. For example, a team did not apply to the computer for a loan, but went instead to a team of faculty members and bankers and negotiated the terms of the loan. In another case, the team was faced with a union problem and worked with a faculty member experienced in labor arbitration in solving the problem.

In another instance, a group of first-year graduate students audited the books of the second-year graduate students who were playing the game. In a game for use with federal government executives, great emphasis was placed on testing men's reactions to a day of crisis. Boards of directors have been used with the Carnegie Tech game to question the men on how they were playing it, and to raise the standards as the players learned. Other intriguing possibilities are the opportunity to hire, to train supervisory personnel, and to negotiate with other teams on the licensing of products, the sale of equipment and buildings, and terms of mergers. Personnel men have a big stake in the success or failure of management games, but as yet have not done much with them.

To get the most from a game in an executive development program, there should be adequate time and leadership for discussion of the results and the experiences of the players, and efforts should be made to integrate the game with what the men do on the job. Games have been used to test prospective employees, but this should be done only if three conditions are met:

1. There must be criteria set so that we know what kind of men we are looking for.

2. We must have a system of measuring behavior and experience in interpreting the meaning of behavior displayed by the candidates.

3. We must have control over the way the game develops so that we understand the stimuli that the man is responding to and reasons why he chose to behave as he did.

Until more experience is gathered it is probably best to observe what happens and pool observations. The danger is that we may assume that behavior displayed in the artificial environment of a game will also be displayed in the real world of management.

The investment is large but worth it

The company that wants its own game, even a relatively simple one, must make a substantial investment in time, money, and talent. However, a company may obtain important side benefits during the process of developing a game. It may provoke a thorough review of the purposes and methods of training programs within the organization; it may create closer working relationships between men who know the company and its problems and the newer, younger employees who have the special skills needed to construct the game model and to program it for the computer; the company may explore in detail many important questions about the effects of managerial decisions and about the interdependence between the company and its environment.

Less expensive are the ready-made games. A non-computer game, however, is not necessarily easy or inexpensive to run. It probably takes more advance planning, more preparation of playing materials, and more manpower to referee the game and check players' calculations.

SOLVE TOMORROW'S PROBLEMS TODAY—WITH A COMPUTER

Winston C. Dalleck, McKinsey & Co., Chicago, Ill.
BUSINESS MANAGEMENT, October 1961; pages 51-55, 96

Business decisions can be pre-tested before a crisis develops by means of simulation. The manager builds a model of his company to reflect actual operating conditions. This is then programed for a computer. The accuracy of the model determines how useful it will be for decision-making.

Some examples are given of simulations which are helping managers run their companies: an oil company wished to cut costs in order to meet strong competition; a major food processing company had to find the best way to handle a transport fleet for

How companies use simulation

shipping raw materials to U.S. refineries; a shipper wanted to find what percentage of his fleet should be owned and what percentage leased; a company getting ready for bargaining sessions with a union simulated its cost structure to test alternate bargaining demands; a company tested various distribution and pricing systems; a company tested the probable cash flow resulting from various major capital investments. A number of companies are working in secret on predictive models for marketing. The reason for secrecy is that usable techniques and concepts which come out of these programs will give the companies a strong competitive edge.

A company contemplating the use of simulation techniques must know what simulation and mathematical models are, where they can best be used, what the main barriers to effective application are, and how to break down these barriers.

Three guides are given for neophytes: 1) Start modestly; pick a project with high payoff potential and a good chance for successful completion. 2) Get help; use outside skills and computer time to begin with. 3) Educate; give those who will work with the simulation problems thorough training in computer know-how, and familiarize others throughout the company with the methods of operations research. Remember, too, that some situations call for other problem-solving methods which are quicker and more economical. But time and money can be saved in many areas through simulation.

"WILL CHANGING PRESIDENTS AFFECT A BUSINESS' SUCCESS?"

SYSTEMS MANAGEMENT, October 1961; pages 28, 42

A business game played by a group of business men at the University of Rochester had eight hypothetical companies competing in the same business market. The game covered ten years of business conditions. At one point, the professors monitoring the game suggested that the companies swap presidents to show the effect of the loss of a "key man" to competition. The surprising result was that those companies which were doing well continued doing well, even with the loss of the top man, and the poor teams didn't improve as a result of the change. An IBM 650 was programed with a mathematical model of a business economy, including such factors as an economic depression and other typical market variables.

Equipment

COMPUTER EQUIPMENT COMPARISONS

Cresap, McCormick and Paget
CONTROL ENGINEERING, October 1961; pages 105, 106

A new series by the well-known accounting firm of Cresap, McCormick and Paget will compare the features and characteristics of electronic computers. As the series progresses, reprints and a special binder will be made available by the publication. Computers to be compared will fall into three classes: Medium ($5000 to $14,000), Intermediate ($14,000 to $30,000), and Large (over $30,000). The series will cover equipment in this order: punched card devices, paper tape devices, printers, magnetic tape devices, random access devices, and central processors. Then will come input-output devices which are optional equipment, then system summaries for the medium, intermediate, and large size systems.

WHAT YOU SHOULD KNOW ABOUT COMPUTER OUTPUT EQUIPMENT

MODERN OFFICE PROCEDURES, October 1961; pages 31-39

((See DPD: November 1961, page 20: "What You Should Know about Computer Input Equipment))

Output equipment working directly from computers falls into four groups: 1) machines that print out answers and results in readable language in the format wanted; 2) machines that capture output in machine language for future use (tape and cards); 3) machines that show readable answers on a screen; 4) units that will graphically produce requested answers in the form of charts or graphs. Care should be used in selecting output equipment to make sure the output gives the type of information required, since the output is the real payoff. A chart is given which lists output equipment available from 22 companies, along with monthly lease costs, output media, and other characteristics.

Applications

ONE BILL INCLUDES ALL LINES

W. G. Bregartner, Chubb & Son, Inc.
THE SPECTATOR, October 1961; pages 46, 47, 86

Through the use of an electronic data processing system, Chubb & Son, Inc., insurance agency, has devised a plan by which an individual may have all or any of his insurance payments combined into one bill. Payments can then be budgeted on a monthly, quarterly, semi-annual, or annual basis.

The success of the program depends upon the accuracy of the information supplied by the individual agents, and while this means they must spend a little more time preparing the original application, they gain time in having the company handle billing, continuation, loss verification, cancellation and reinstatement procedures.

Each agent is assigned a number, and he in turn assigns each client a number. The agent number and client number, along with the policy number, make up the identifying code for each policy. An IBM 705 is used for the initial underwriting. The policies then go to the underwriter for review and final acceptance or rejection. All billing and accounting is performed by the computer, although the agents may send out the premium notices if they prefer. Commission checks are automatically figured and written by the computer, and a by-product of the entire process is a listing of expiring policies which is sent to the appropriate agent. If the policy is renewed, it is merely noted on the expire list, saving the time and trouble of preparing a new policy. Losses reported before 1 PM are cleared up the following day.

NEW SYSTEMS FOR A NEW HQ

AUTOMATIC DATA PROCESSING, October 1961; pages 25-28

Dorothy Perkins, Ltd., a ready-to-wear chain store operation, has installed a Bull Gamma 3 computing system for stock control and ordering. Each branch has its theoretical optimum stock expressed quantitatively for each garment definition, size and color. These stocks can be adjusted by a central decision which immediately affects the warehouse order filling operation. The branches can, for example, be prevented from stocking up with one line when a new one of similar type is due to come in within the following week. All available stock is distributed evenly throughout the branches, preventing a first-order -- first-serve kind of partiality.

Simplify the input system

Since no clerical staff was available at the branches to be the professional arm of the central data processing system, the company took a chance and minimized the clerical work, then relied on the branch personnel to carry out the system. The branches mark pre-punched input cards for the machine system, each one on its specific day of the week, according to merchandise availability lists sent by the central office. The branch notes its present stock on the availability list and then marks its stock for each line on the input cards. Branches do not calculate their orders or list their registered stock. They merely list the stock they hold. The computer checks this list against their registered stock in computer memory and determines what the store needs. This operation also produces the invoice for each branch and adjusts the warehouse stock balances.

By-products of this system are: daily warehouse stock list which shows exceptional stock balances; daily dispatch list; weekly stock list by item and value; weekly statements of dispatches of merchandise.

The system allows a branch to include a note with its order card asking that certain items be eliminated. Also, the main procedures may be overridden for special orders and deliveries.

RYERSON TURNS PAPERWORK INTO WORKING PAPER

BUSINESS AUTOMATION, October 1961; pages 22-27

Joseph T. Ryerson & Son, Inc., Chicago steel company, has developed an order-filling system which can handle 90% of the orders on a same-day or next-day delivery. All sales units and order processing units are consolidated on the fourth and fifth floors. These, and other departments are linked with a conveyor system for manual loading and automatic unloading of communications. A central Wire Communications Center connects with 20 service centers across the country. The IBM 1401 and 7070 computers handle the order processing system as well as payroll, accounts payable and receivable, sales analysis, sales costing, and maintenance of the customer mailing list. The company expects to have within a few years, a program to help locate quickly and accurately the nearest plant having the stock required to fill an order, to check credit, to schedule the order, and to do other jobs vital to the sales and operating functions.

Points of Interest

Unicall, a computer inquiry voice-reply device has been announced by Remington Rand. The device will be used with the UNIVAC Real-Time Computing System.

Australia's Department of Defence will install two Honeywell 800 computers next summer as the first phase of a joint-services automatic communications network which will eventually include six computer installations. During peacetime the centers will handle accounting and inventory control.

Chevrolet dealers are now able to contract for use of an inventory control and ordering system for spare parts called AID, furnished by the Service Bureau Corporation.

The use of computers for biological and medical research is expected to increase rapidly because of the crucial need for retrieval of vast amounts of medical literature and records. This was the recent opinion of Dr. Frederick J. Moore of the University of Southern California School of Medicine.

Hypertape is a new cartridge-loading technique which provides fast tape change and tape processing in the IBM 7074 and 7080 computers. The cartridge, containing two reels of tape, is inserted into the tape drive. When a button is pressed, the machine opens the cartridge and engages the tape. Unloading may be done at any time, since the tape need not be rewound. The cartridge protects the tape from dust and damage because the sealed container is automatically opened only after it reaches a clean area of the machine. An error detection system is included in the Hypertape design.

The RCA 301 has been improved with a nearly nine-fold increase in magnetic tape speed and a core memory unit with twice the capacity of the former model. The new system can use 12 or more magnetic tape stations.

WFF 'N PROOF is a series of 24 mathematical games developed by Prof. Layman E. Allen in the Accelerated Learning of Logic (ALL) Project at Yale University. The games range in complexity from those mastered by six-year-old children to those challenging to university teachers of mathematical logic. A complete kit of the games may be ordered from Prof. Allen, Center for Advanced Study in the Behavioral Sciences, 202 Junipero Serra Blvd., Stanford, California.

Comment

CHOOSING A LANGUAGE

What should a computer language have?

COBOL? FORTRAN? FACT? TABSOL? Not only must the computer user select an equipment system suitable to his needs, but he must determine which language his programers will use to describe the computer procedures. Three basic considerations are involved in the choice of a "source" language:

1. The language must provide the capability, flexibility and convenience desired to permit programers to write and test the programs quickly and easily.

2. The language must be clearly and completely defined and the translator or compiler program necessary to convert the source language programs into machine (object) language must exist and be tested.

3. The process of compiling must not consume an unreasonable amount of computer time.

The existence of a defined language and proved translator for a particular computer can best be determined by consultation with other users. (If the translator is not completed, its availability will depend upon the reliability and skill of the system supplier.) Compiling time is also best determined by discussion with present users of the translator. In the absence of the working translator, estimates by independent skilled programers are probably better than the manufacturer's naturally optimistic timing.

The comparison and evaluation of the usability of source languages is more difficult, involving the nature of the application, the skill level of the programers and matters of taste. Some of the points to review are listed below. Remember that each added sophistication in the language adds to the compiling time and to the programer skill required, but will result in an object program of greater efficiency.

How to evaluate a source language

Factors in the Evaluation of Source Languages

- General orientation intended: engineering, business, special

- Method of describing data (files, inputs, outputs):

  Features in describing items (fields): Can decimal point be assumed? actually designated? Are non-significant zeros suppressed? Is left and right justification available? Can "floating point" numbers be expressed? How is the field size designated?

Features in describing files: Can there be different record formats in one file? different record sizes? What file label features are provided?

Data structure rules: Can items be grouped into levels? Can input-output blocking be controlled (to improve speeds in the object program)? What size limitations are there on items, records, files? Can items be redefined to permit overlaying memory? for convenience in sectionalizing programs? Are there source language features to help efficient storage allocation?

Item naming: What characters are permissible? excluded? Can alphabetic and numeric characters be mixed? Are synonyms permitted?

- Methods of describing the procedures:

How are procedural statements sequenced? How flexible is the statement numbering system?

What is the general format: English mnemonics, algebraic symbols, mixed?

How are parentheses handled? Can they be nested?

What operations are available: Arithmetic? Mathematical? Condition testing: greater than, equal, less than, etc.? Decision tables permitted? Editing, code conversion? File control, such as: advance to next record, take proper action on sentinels, establish roll-back point, tape error procedures?

- Operand rules:

How are operands named (item name? code? location?)? Are multiple operands permissible? with what restrictions? Are literals allowed (i.e. actual data instead of name of items), e.g., constants? numerical? alphabetic? spaces, fillers, etc.?

- Restrictions on loops and repeated sequences:

Method of control: Counting, size of a variable, conditional transfer? Are alternative exits permitted? Are switches possible? how set?

- Subroutines:

How are subroutines called? Which are already available? Can subroutines be nested? used recursively (i.e., call themselves)?

- Language extension:

  Is it possible to add operations? In what language are they written?

- Error Control:

  What is done to include functions to detect and report or correct errors such as overflow, invalid data, machine errors, etc.?

This list will indicate the complexity involved in judging languages; and this list does not include factors related to the program library facilities, translator control, nor the features of the translator itself (such as debugging aids) which are vital. A skilled system programer should certainly be consulted when the selection of a programing language must be made.

Training

1962 Engineering and Management Course, sponsored by UCLA Engineering Extension

Date: January 22 through February 1, 1962
Place: University of California at Los Angeles
Fee: $450 (includes all class materials, lunch each day and closing dinner)
Information: W. Clare Ennis, Assoc. Coordinator, The Engineering and Management Course, College of Engineering, Room 6266, University of California, Los Angeles 24, California

Meetings

1961 Eastern Joint Computer Conference

Date: December 12-14, 1961
Place: Washington, D.C. (Sheraton-Park Hotel)
Theme: Computers--Key to Total Systems Control

Programmed Learning, theme of Annual Meeting of Pacific Southwest Section of the American Society of Engineering Education

Date: December 28, 29, 1961
Place: Las Vegas, Nevada (Stardust Hotel)
Information: Howard B. Blodgett, Dean of Engineering, University of Nevada, Reno, Nevada

IFIPS Congress (International Federation of Information Processing Societies)

Date: August 27 - September 1, 1962
Place: Munich, Germany
Information: Dr. W. Buchholz, IBM Corporation, South Road Laboratory, Poughkeepsie, N.Y.

References

DATA PROCESSING DIGEST does not provide copies of the original material digested or reviewed in this issue. The publishers' addresses are listed below for your convenience in writing to them for more complete information.

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London SE 1, England

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600 W. Jackson Blvd.
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